CALIFORNIA'S TRANSPORTATION SYSTEM PERFORMANCE MEASURES

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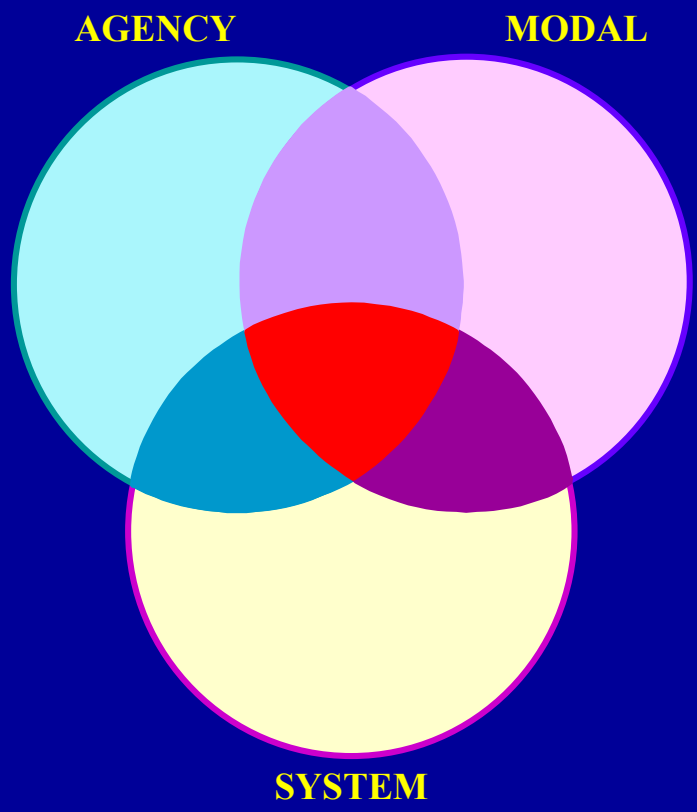
- **Briefly Introduce California's Transportation System Performance Measurement Project**
- **Provide a Summary of the Accomplishments to Date**
- **Discuss Implementation Status**

THERE ARE MANY TYPES OF PERFORMANCE MEASURES



California's Performance Measures Focus on the Multi-Modal Transportation System

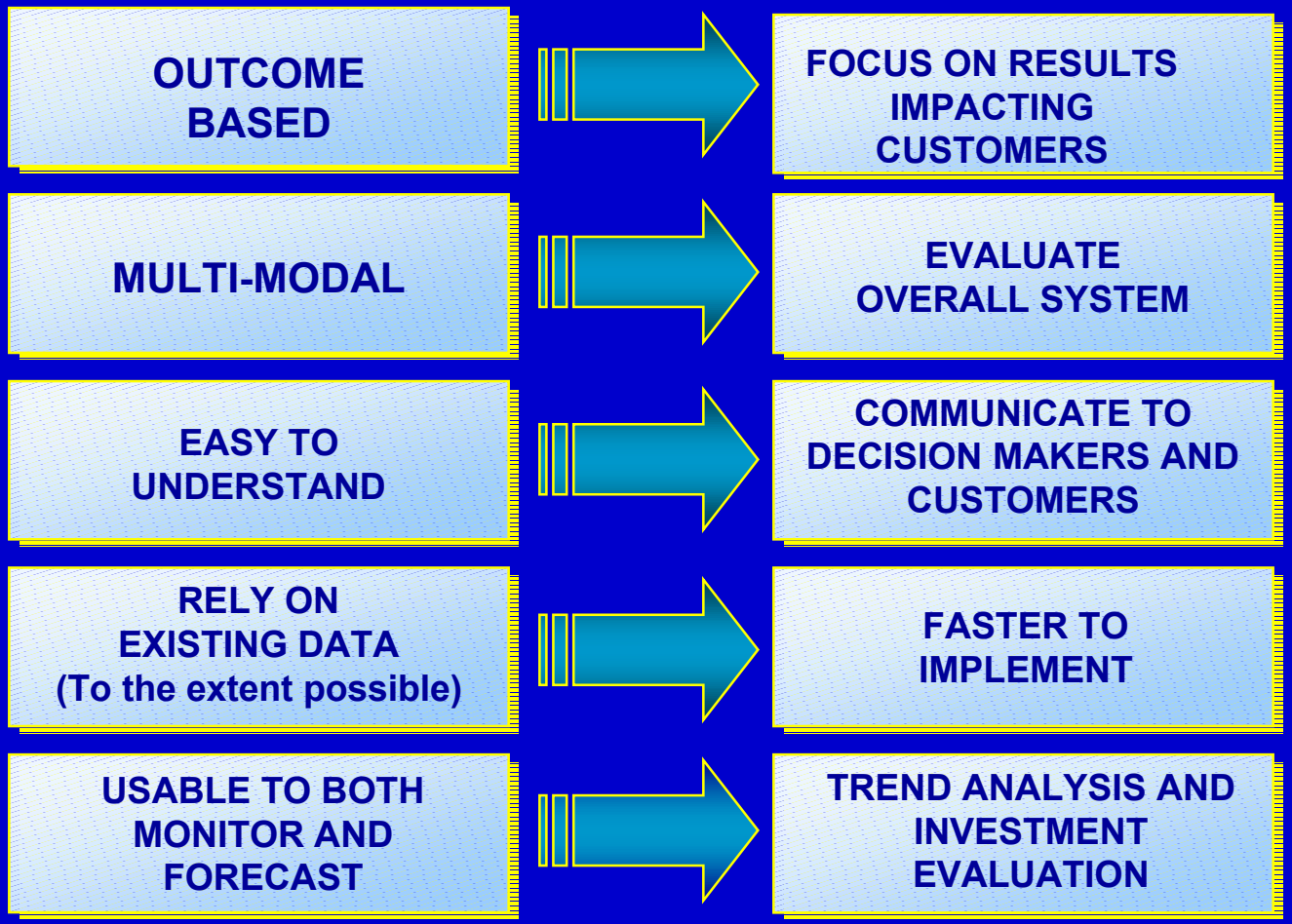
What are Performance Measures?

- **Tool of standard management practice.**
- **Tool to help understand how the system operates and why.**
- **Tool for consensus building.**
- **Tool to help develop information needed by decision makers.**
- **Tool to help develop understandable and relevant information to transportation users.**

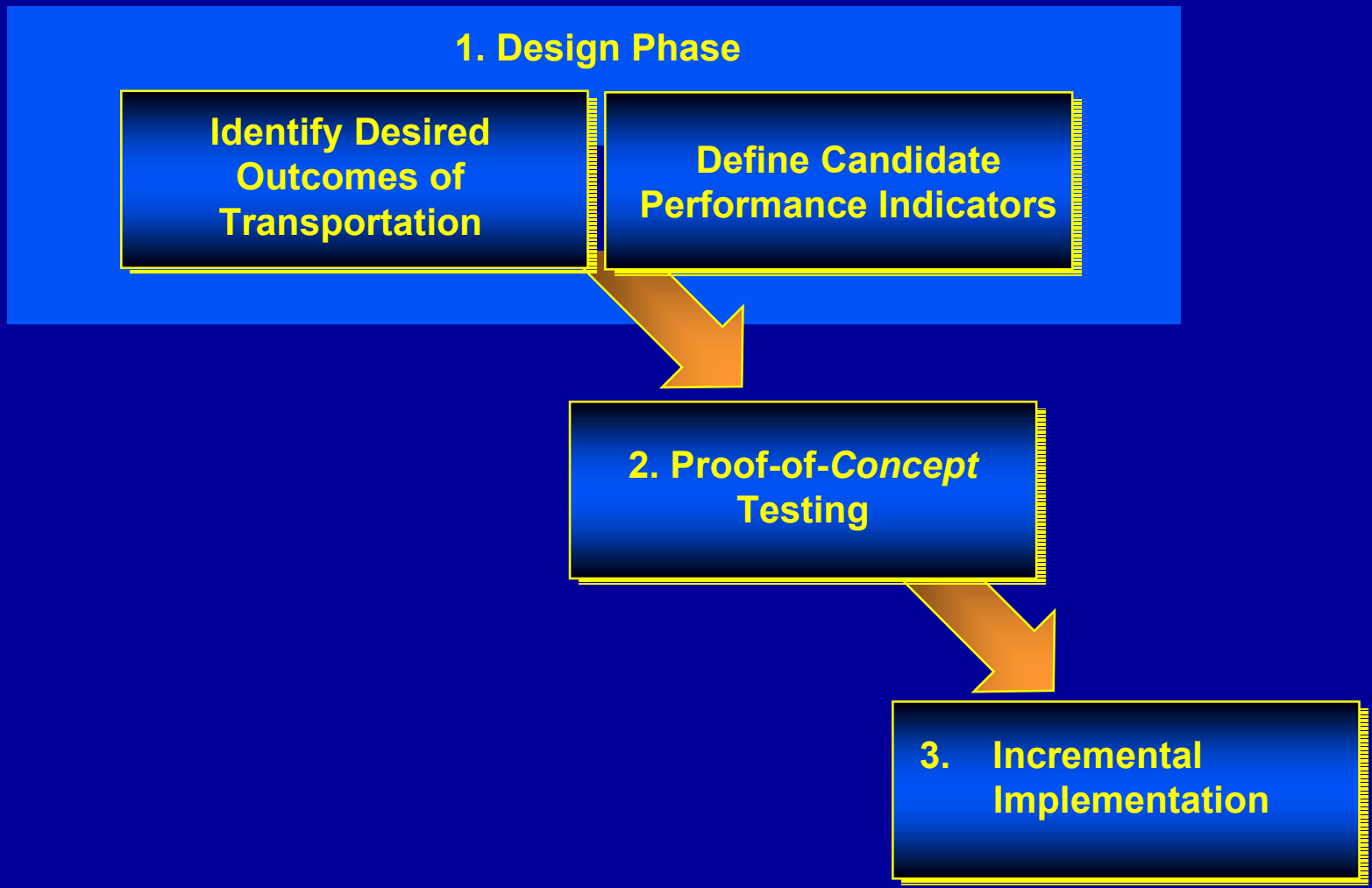
How Will We Use Performance Measures?

- **Monitor and evaluate system performance.**
- **Share existing data and future forecast performance information.**
- **Develop modal-neutral customer and decision information.**
- **Build consensus using performance measures information.**
- **Improve accountability of system development and operations.**

KEY ELEMENTS OF CALIFORNIA'S PERFORMANCE MEASUREMENT



PERFORMANCE MEASUREMENT PROJECT PHASES



THREE PHASE PROJECT

Design Phase - gain support for the project, identify how transportation system performance can be measured, how performance measurement would be used, and how it will be implemented. This phase identified desired outcomes and defined candidate performance indicators

THREE PHASE PROJECT

Proof-of-Concept Testing - test candidate performance measures developed in the first phase, share findings with local and regional agencies, and continue coordinating performance measurement development with these agencies. This phase refined our framework for full deployment and implementation.

THREE PHASE PROJECT

Incremental Implementation - implement the refined framework relying on technology initiatives where appropriate and build on existing tools and methodologies where possible. This phase is where we are integrating performance measures into existing planning and programming processes.

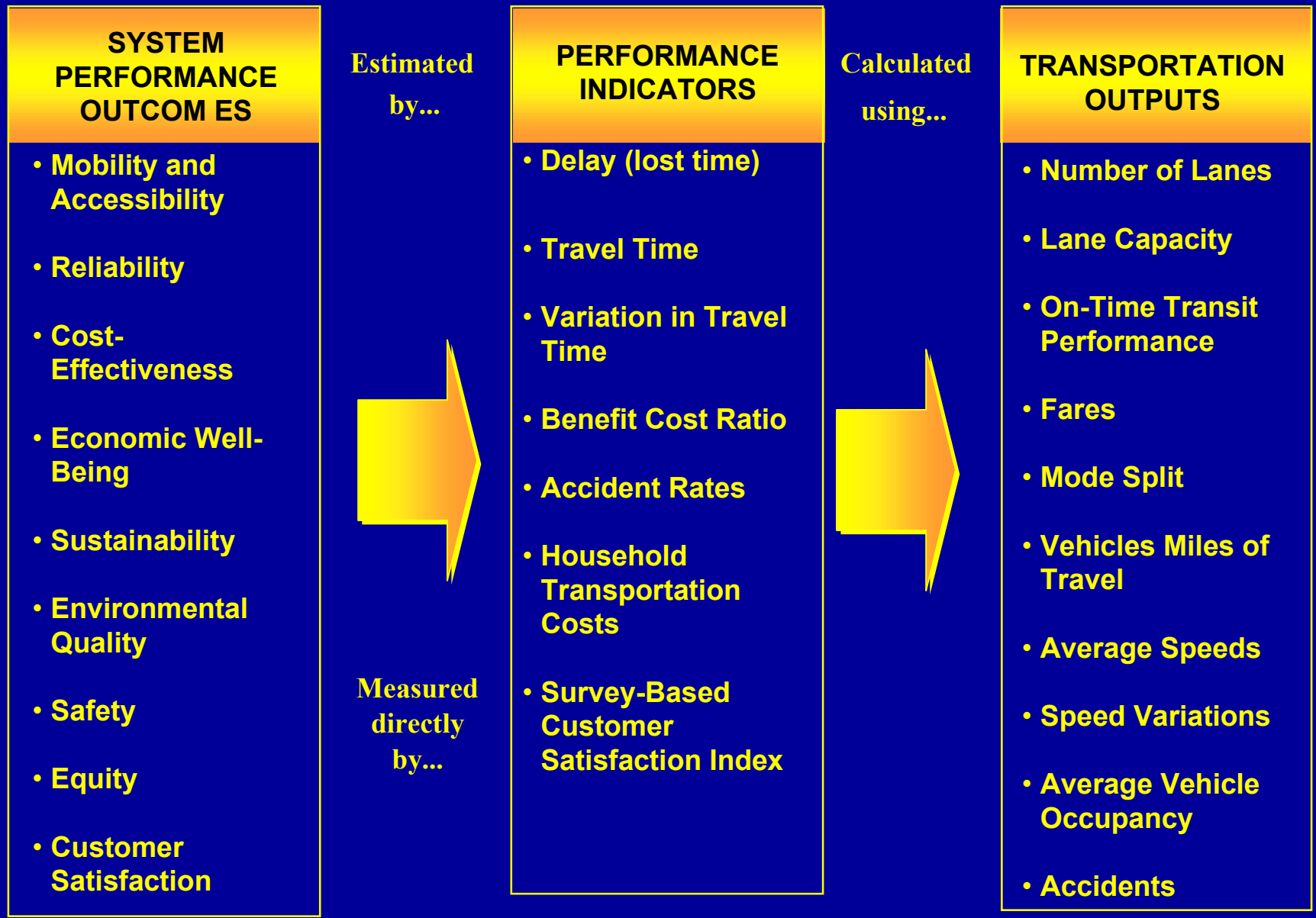
PERFORMANCE OUTCOMES AND CANDIDATE MEASURES

DESIRED OUTCOMES	DEFINITION	CANDIDATE MEASURES/ INDICATORS
• Mobility/Accessibility	• Reaching desired destination with reasonable cost, time and choices.	• Travel Time/Delay/Access to Desired Locations & System
• Reliability	• Variation in travel time.	• Variability of Travel Time
• Cost-Effectiveness	• Maximizing current and future benefits.	• Benefit / Cost Ratio
• Sustainability	• Preserving the system, meeting present needs in balance with future needs.	• Outcome Benefit per unit of Cost • Household Transportation Costs
• Environmental Quality	• Maintaining and enhancing the environment.	• Accidents/Incidents
• Safety and Security	• Minimizing injury, property and risk.	• Benefits per Income Group
• Equity	• Distributing benefits and burdens fairly.	• Customer Survey
• Customer Satisfaction	• Providing transportation choices and services that meet customer needs.	• Final Demand (Value of Transportation to the Economy)
• Economic Well-Being	• Contributing to California's economic growth.	

PERFORMANCE MEASURES

MEASURE	APPLICABILITY	STATUS
Mobility/Accessibility	Monitoring	Fully Tested
Reliability	Monitoring	Fully Tested
Cost-Effectiveness	Forecasting	Testing Ongoing
Sustainability	Not Determined	Testing Ongoing
Environmental Quality	Monitoring	Fully Tested
Safety and Security	Monitoring	Tested
Equity	Not Determined	Not Tested
Customer Satisfaction	Not Determined	Not Tested
Economic Well-Being	Forecasting	Testing Ongoing

RELATIONSHIP BETWEEN OUTCOMES AND OUTPUTS



MOBILITY

- Reaching Desired Destination With Reasonable Cost, Time and Choices.
- Average Point-to-point Travel Times and Travel Delay.
- Delay Is the Additional Time Spent Traveling Due to Less Than Optimal Circumstances (E.G., Congestion, Schedules)
- Point-to-point Travel Times Is Data Intensive. Focus of Mobility Is Travel Delay.
- Delay Calculation: is calculated by subtracting free-flow travel time from the average travel time. Free-flow travel time is the posted speed.

Example: distance traveled = 10 miles; posted speed = 65 mph.
Then the free-flow travel time is 9.2 minutes

$$9.2\text{min} = \left(\frac{10\text{miles}}{65\text{mph}}\right) \times 60\,\frac{\text{min}}{\text{hour}}$$

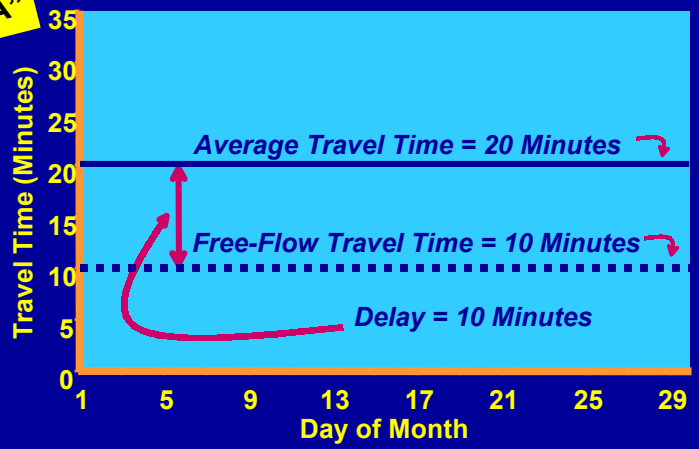
RELIABILITY

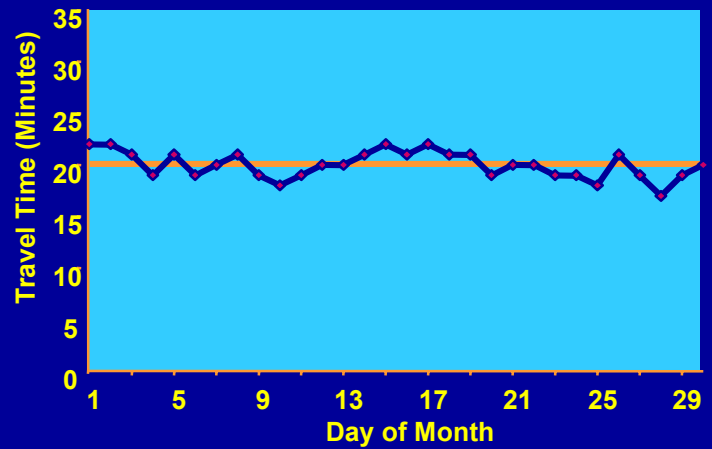
- Reliability - variability in transportation service between the expected and actual travel time.
- Standard deviation is used to describe "deviation" from expected or mean travel time.

Example: Average Travel Time - 24.5 min
Actual Travel Time - 36.5 min
Standard Deviation - 9.6 min
Percent Variation - 39 %

MOBILITY VERSUS RELIABILITY

Highway "A"



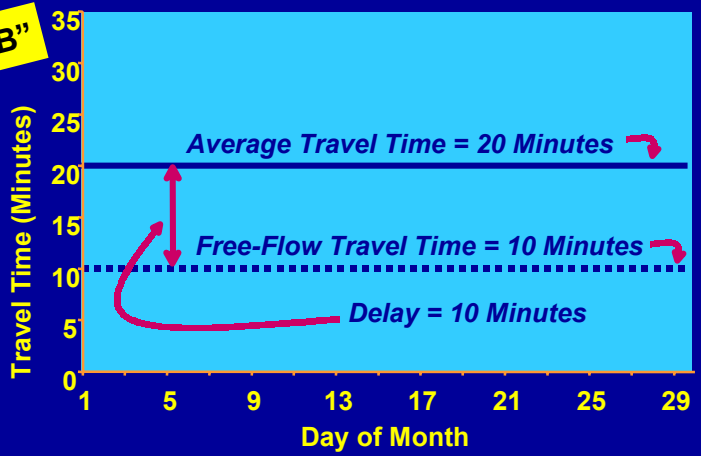


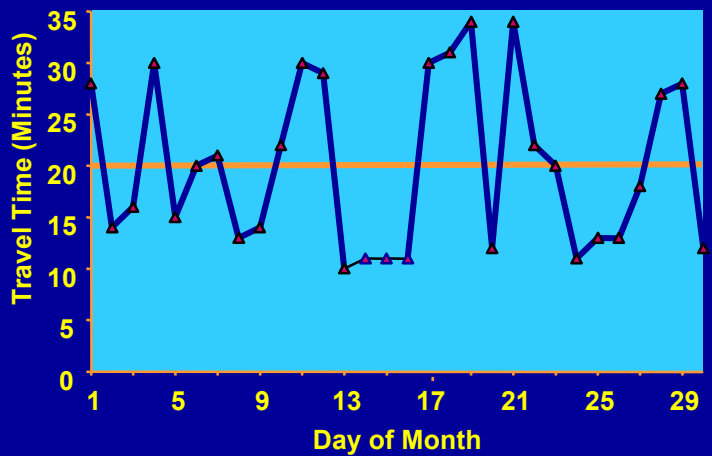
Same Mobility, but...

Highway "A" is More Reliable

Highway "B" is Less Reliable

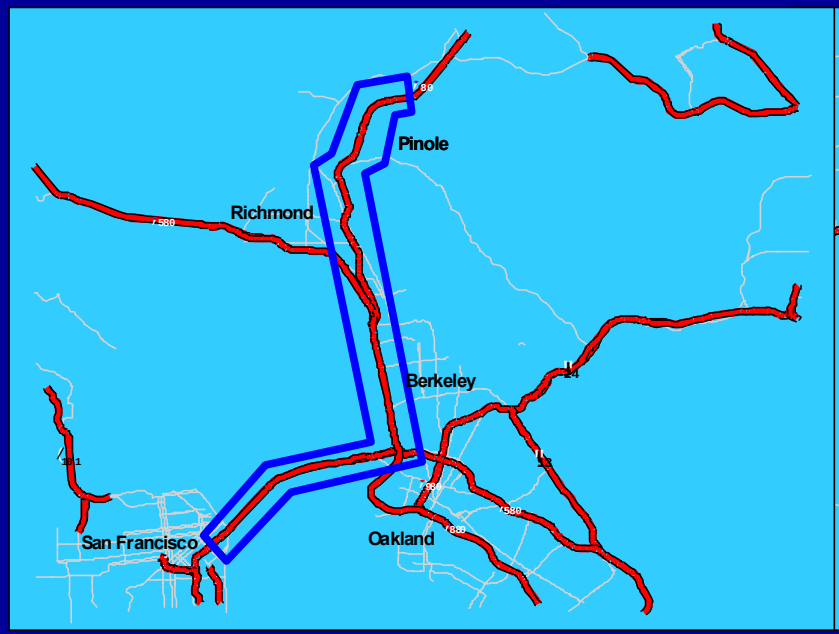
Highway "B"





HIGHWAY MOBILITY AND RELIABILITY EXAMPLES

San Francisco



Los Angeles

Time of Day	MOBILITY: Average Travel Time (Minutes)	MOBILITY: Average Delay (Minutes)	RELIABILITY: Standard Deviation (Minutes)	RELIABILITY: Percent Variation
6:00-6:30 AM	12.4	5.3	1.1	9%
6:30-7:00 AM	13.3	6.3	1.9	14%
7:00-7:30 AM	19.7	12.7	1.6	8%
7:30-8:00 AM	22.0	14.9	2.6	12%
8:00-8:30 AM	22.3	15.3	3.0	14%
8:30-9:00 AM	18.9	11.8	1.8	10%

Time of Day	MOBILITY: Average Travel Time (Minutes)	MOBILITY: Average Delay (Minutes)	RELIABILITY: Standard Deviation (Minutes)	RELIABILITY: Percent Variation
5:00-6:00 AM	24.5	12.0	9.6	39%
6:00-7:00 AM	35.5	23.0	12.2	34%
7:00-8:00 AM	41.0	28.5	14.0	34%
8:00-9:00 AM	36.2	23.7	14.3	39%

WHAT DOES RELIABILITY TESTING TELL US?

- Reliability testing in the San Francisco Bay Area, Los Angeles County, Orange County and San Diego County.
- Peak period variability ranges from 10 to 50 percent with most segments tested experiencing delays of less than 30 percent.
- Reliability may not be correlated with delay. Some areas that have high delay also may exhibit low variability in travel time.
- Reliability appears to depend on a number of factors including distance between interchanges, geometrics, among other factors.

TRANSIT DELAY AND RELIABILITY INDICATORS

Step ① Compute Optimal Travel Time

Example:

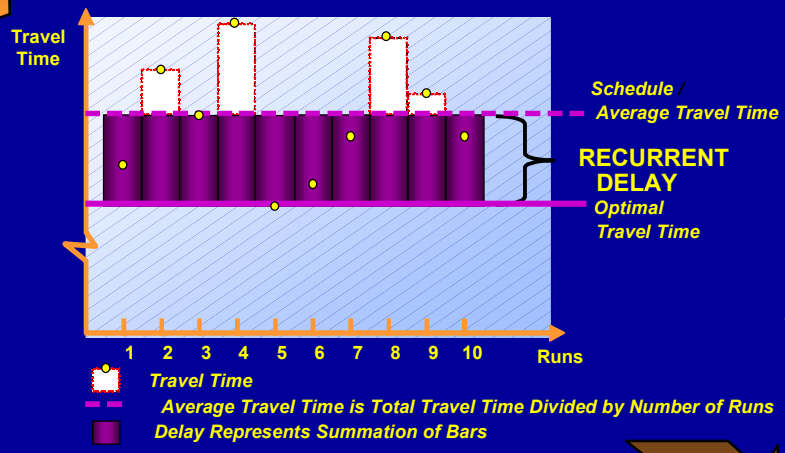
Route length: 20 miles
Percent local service: 90%
Optimal local speed: 15 mph

Percent highway service: 10%
Optimal highway speed: 65 mph

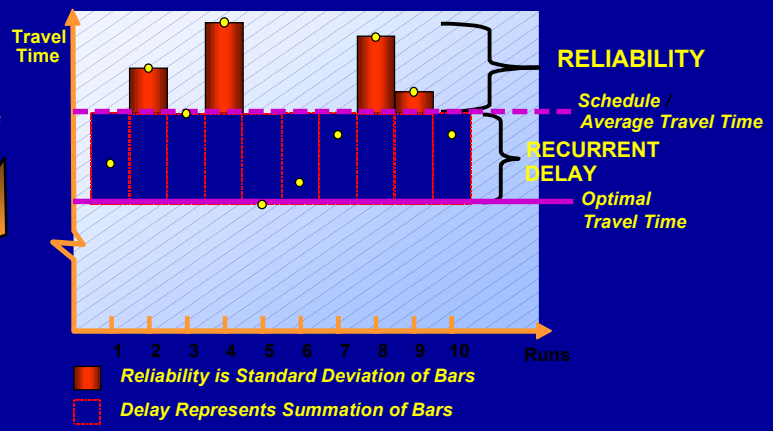
Weighted average optimal speed
= (0.90x15)+(0.10x65)
= 20 mph

Schedule: 75 minutes
Optimal travel time: 60 minutes

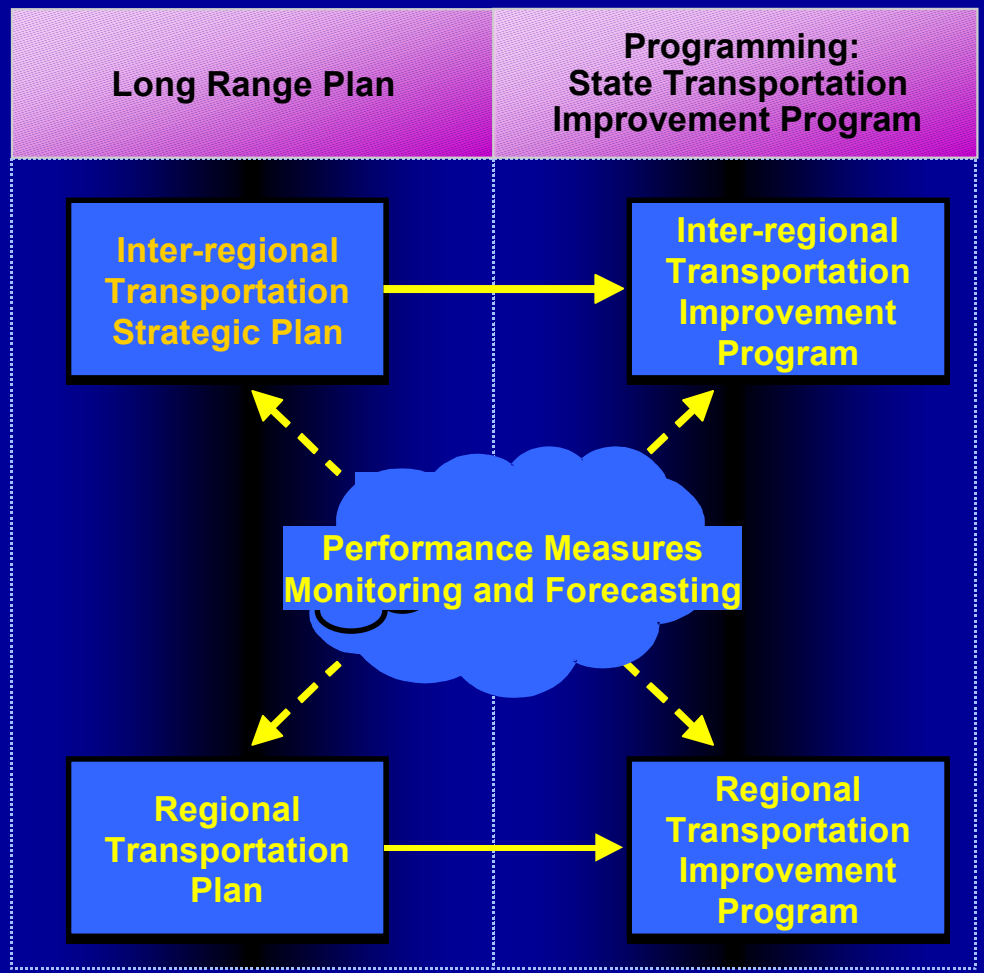
Step ② Plot Actual Travel Time & Calculate Delay



Step ③ Compute Variability in Travel Time



INTEGRATION INTO EXISTING PLANNING AND PROGRAMMING PROCESSES



DATA

	Connect TMCs to PeMS	Complete Detector Fitness Initiative	Extend Detector Coverage and Connect to PeMS
District 1	0	0	1
District 2	0	0	1
District 11	2	2	3
District 12	3	2	3

CONNECT TO PEMS

0 = District does not have a TMC and does not receive real-time loop data continuously.

1 = District has a TMC, but does has not have transportation management software (TMS)

2 = District has a TMC and TMS, but no linkage to PeMS yet

3 = District has a TMC and TMS, did have linkage to PeMS that is currently being restored

4 = District has a TMC and TMS and live linkage to PeMS

COMPLETE DETECTOR FITNESS INITIATIVE

0 = Not applicable (little or no loops in district)

1 = Less than 50 percent of the loop data is accessible by the TMS (Estimate)

2 = Less than 75 percent (but more than 50 percent of the loop data is accessible by the TMS

3 = More than 75 percent of the loop data is accessible by the TMS

EXTEND DETECTOR COVERAGE AND CONNECT TO PEMS (gaps may be addressed by additional loops or alternative technologies, connection to PEMS to be determined)

1 = Gaps cover the majority of the system.

2 = Considerable gaps exist, but the majority of the system is covered

3 = Few gaps exist

WHAT'S NEXT?

QUESTIONS?